Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of Report of the Spectrum Policy Task Force	**Docket 02-135**

Comments of Time Domain Corporation

1. GENERAL REMARKS

Time Domain compliments the FCC for this tremendous undertaking. The Report of the Spectrum Policy Task Force[1] is an important step toward a reform of the nation's spectrum management system. Those who are happy with today's regulatory structure tend to be well organized, while the public and those who stand to benefit from a realignment of the spectrum management regulatory structure are not. Clearly, the FCC undertook this review because it recognized that the evolving needs of the nation are outgrowing the current regulatory system.

As the leading UWB proponent in the Ultra-wideband ("UWB") regulatory process[2], Time Domain is aware of the weaknesses with today's regulatory structure. We foresee tremendous advantages to the public from implementing a new regulatory structure along the

[1] Report of the FCC's Spectrum Policy Task Force, ET Docket 02-135, November 2002.

[2] FCC OET Docket 98-153.

lines of the November 2002 report of the Spectrum Policy Task Force. Time Domain supports continued analysis, refinement and, eventually, action on the concepts identified in the Task Force's report.

2. SPECTRUM COMMONS & INTERFERENCE TEMPERATURE

Time Domain has long advocated UWB as a technology with the potential to make more spectrum available for unlicensed applications; in essence, a spectrum commons through spectrum "underlay" or an easement under Part 15 of the Commission's rules. The FCC clearly acknowledged this potential when it issued the UWB First Report & Order[3].

The new UWB regulations allow UWB devices to increase spectrum utilization by allowing them to share spectrum with existing users. However, because it was necessary to establish rules that are universally applicable, the FCC crafted hard limits on the emitted field strength. These rules preclude operating at higher power levels even in environments were no other RF systems are operating.

The Spectrum Task Force's concept envisions an era of softer limits that are adjusted to accommodate different operational environments. The issue is then how to effectively determine the interference temperature at a given point in space and time. Time Domain's concern is that a single narrowband emitter could effectively prevent a UWB device from operating if the concept of interference temperature does not account for the properties of UWB systems. As Figure 2-1 illustrates, if just a single narrowband emission were at the

[3] FCC 02-48

interference temperature limit, then that device would preclude the use of a UWB transmitter that emitted into that narrowband channel, even if the remainder of the band occupied by the UWB signal were absolutely quiet.

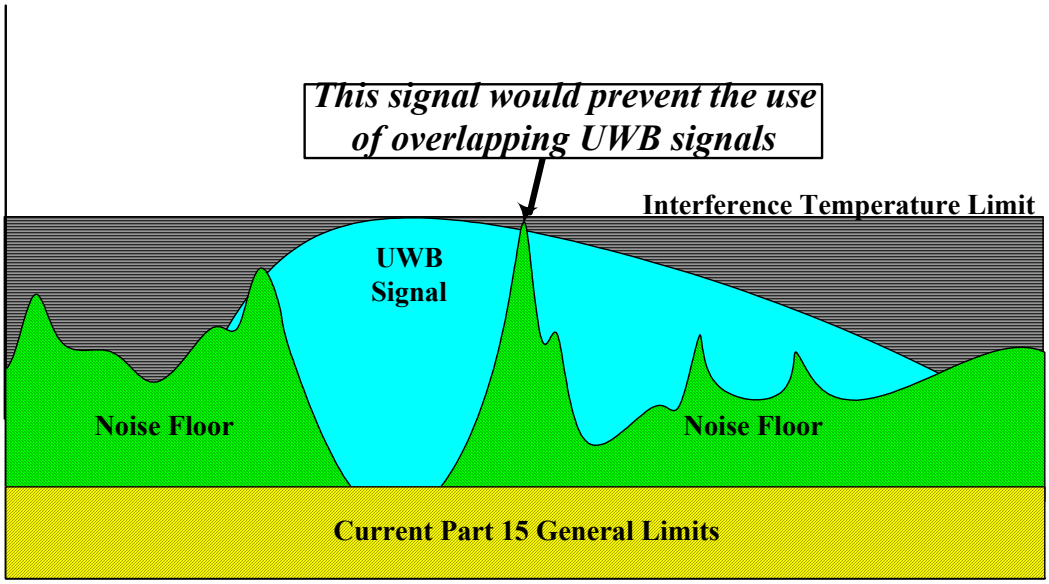

Figure 2-1. The "interference temperature" concept, if implemented incorrectly, could lead to a situation where a single narrowband signal could prevent the use of a UWB device even though most of the UWB signal would not violate the interference temperature limits.

Interference temperature is defined in the Report as a measure of "RF power available at the receiving antenna per unit bandwidth"[4]. In the case illustrated in Figure 2-1, if the interference temperature were averaged over the bandwidth of the UWB signal, the UWB device would be allowed to operate. If, on the other hand, smaller bandwidths were used to establish the local interference temperature (e.g., a resolution bandwidth of 1 MHz), then the UWB device would not be allowed to emit because the single narrowband signal is at the interference temperature limit.

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[4] Report p. 27.

There is an additional potential issue for UWB devices. The Report states:

> "For example, a low power unlicensed RF device could be designed to scan its particular frequency band before transmitting. Its built-in "thermometer" would record interference temperature data and compute the appropriate statistical aggregate value. The device would then project the increase in interference temperature due to its operation over its nominal range. This value would be compared with the permissible limit. If its operation would exceed the limit, the device's controller could execute an appropriate response such as reducing power, switching to a different transmit frequency (if available) or, perhaps, continuing the scanning/sensing process to locate an opportune time to transmit."

While it is possible for a UWB receiver to estimate the received power within its operating bandwidth, it is generally impossible for the UWB receiver to determine how that power is distributed across the bandwidth. It is then generally impossible to estimate the power in any specific narrowband channel.

Time Domain has direct experience with this issue. Time Domain has a UWB-based propagation instrument that measures in real-time in-band power levels as seen by the UWB receiver[5]. However, this measure is actually the convolution of the characteristics of the receiver system and all the signals present in that area. The UWB receiver output does not allow calculation of the power spectral density of RF energy across narrow resolution

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[5] P. Withington, R. Reinhardt & R. Stanley, "Preliminary Results of an Ultra-Wideband (Impulse) Scanning Receiver," Session 38, Paper 3, IEEE MILCOMM'99, Atlantic City, New Jersey, October/November, 1999.

bandwidths. While one can envision a system that could do this, it would undoubtedly be complex and so impracticable to implement in consumer devices.

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Ultra-wideband represents an early success for the Commission in realizing the ideas set forth the Spectrum Management Report. While Time Domain looks forward to continued progress towards adoption of the principles set forth in the Report, we urge the Commission to consider carefully the implementation of these ideas to ensure that they do not have unintended consequences on technologies that are already using spectrum in innovative ways to benefit the public. UWB devices gain their advantages from utilizing extremely broad swaths of spectrum. Because of this, UWB devices do not have the ability to mimic narrowband radios. The FCC should consider the nature of UWB when crafting new rules to ensure that it does not create a set of rules that prevents the practical use of UWB.

Respectfully Submitted
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